

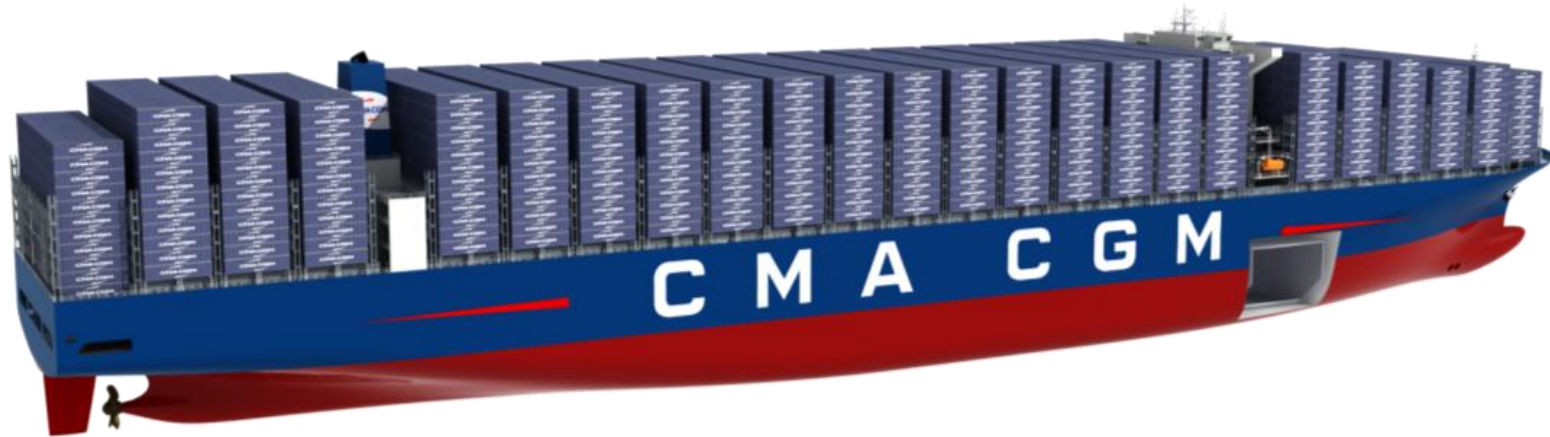


Transformative Innovations

What shipping will soon look like

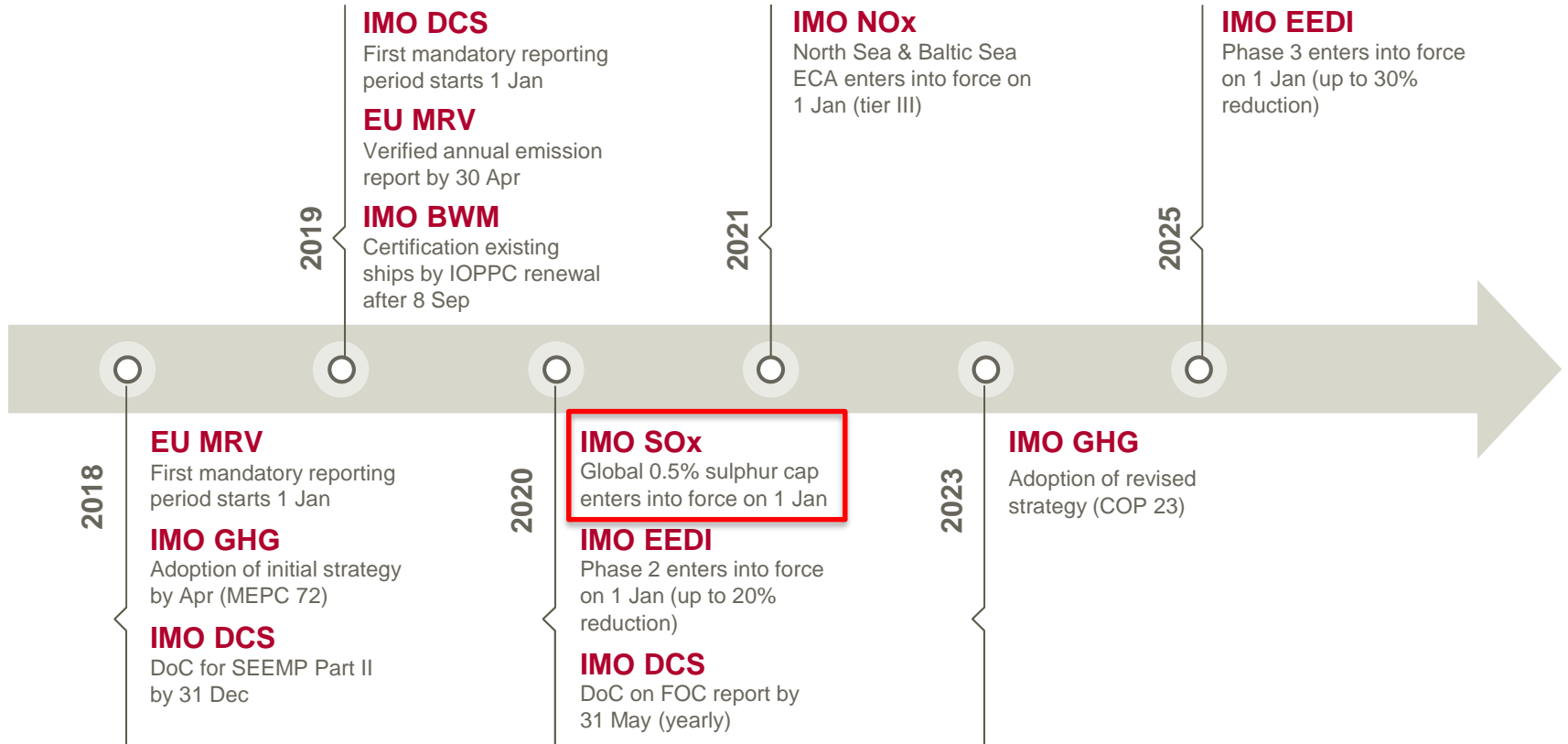
ShippingInsight
Stamford CN, 16th October, 2018

Martial CLAUDEPIERRE
Bureau Veritas

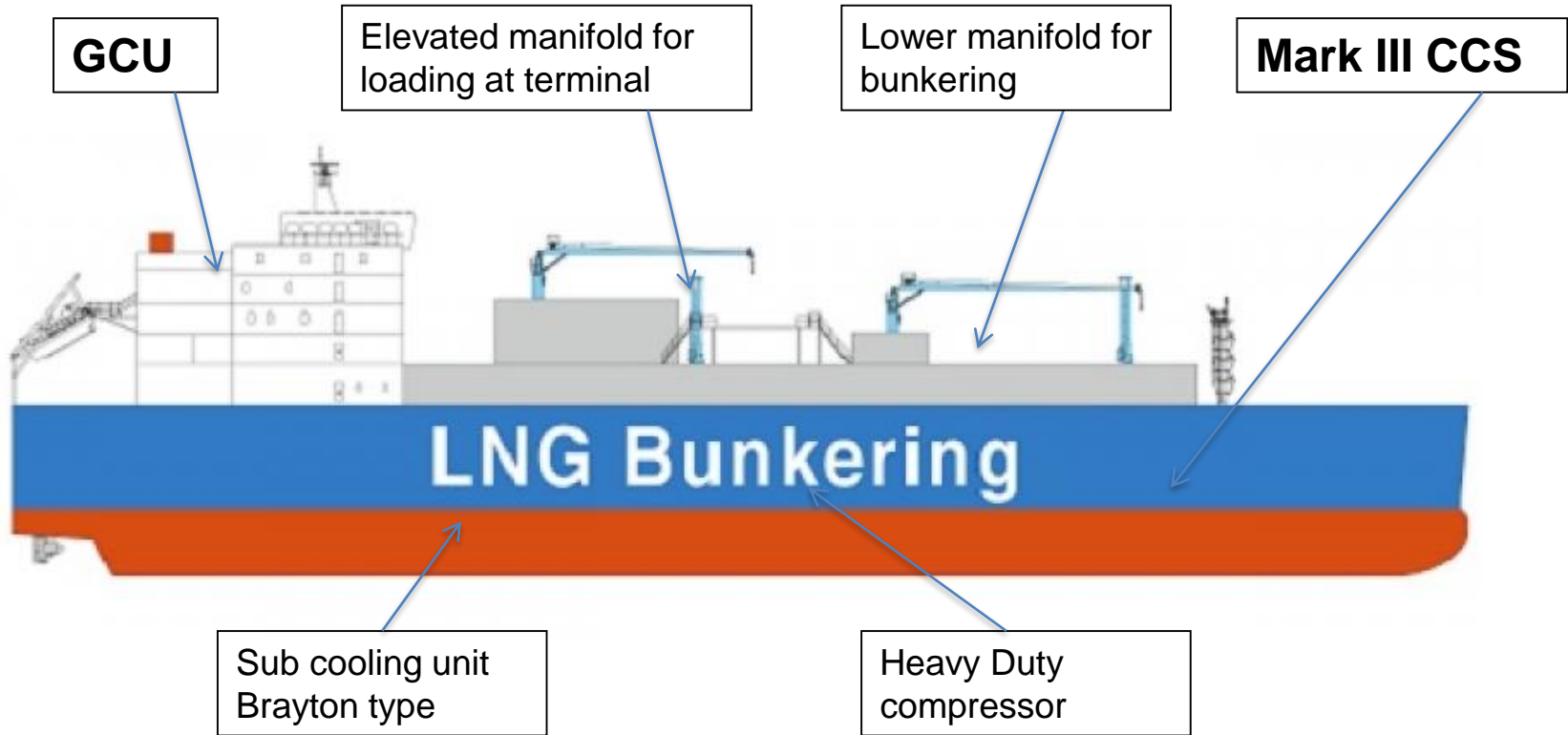


Environmental regulation in shipping

Timeline 2018 – 2025



LNG Bunker vessel – MOL Total – 18600 cbm – GTT CCS



Shipping 4.0

→ Smart tech provides new opportunities



Improve safety



Reduce environmental impact

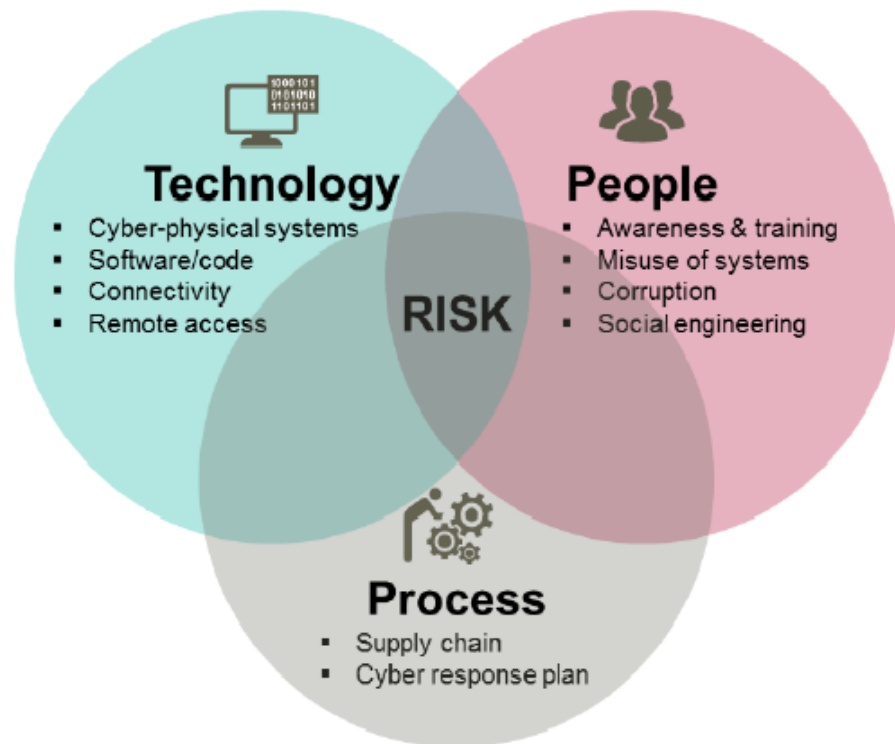


Minimize opex



Optimize fleet management

→ But also new threats and challenges



Autonomous ship

Distant future or tomorrow reality ?



Towards decarbonized shipping

Post MEPC 72 - IMO GHG initial strategy (May 2018)



- Reduce total annual GHG emissions by at **least 50% by 2050** compared to 2008
- Pathway of CO₂ emissions reduction consistent with Paris Agreement temperature raise goals

Fuel	Fuel density (kg/m3)	Energy per volume* (kWh/l)	Specific energy* (kWh/kg system)
HFO or MGO	855 - 980	10 - 11	12
LNG	428	5,8	10
LPG	537	6,7	
Liquid Hydrogen	70	2,3	25 (fuel cell)
H2 @ 700 bar	42	1,4	2,6
Liquid Ammonia	680	3,1	



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Back to the future ?



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